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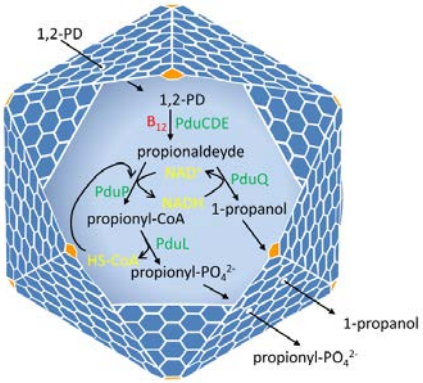
More Background on Bacterial Microcompartments

Bacterial MCPs have broad importance in bacteria. Bacterial MCPs are distributed among hundreds of species of bacteria, including many pathogens where they perform diverse metabolic functions. However, only a few types of MCPs have been studied in any detail. Hence, more work is needed to appreciate their roles in diverse bacteria and in microbial ecology.



Bacterial MCPs consist of metabolic enzymes encapsulated within a protein shell. This arrangement accelerates catalysis and confines toxic metabolic intermediates. Important research questions include, how are MCPs assembled from thousands of protein subunits and how does a protein shell mediate selective molecular transport.

Bacterial MCPs are structurally unique. MCPs are built from thousands of protein subunits and are one of the largest known multi-protein complexes. Unlike other organelles, they consist of metabolic enzymes encapsulated within a protein shell and lack any membrane. This unique design raises varied questions about how they are assembled and the principles that underlie the use of a protein shell for selective molecular transport. Thus, further research on MCPs may reveal new biochemical paradigms some of which might broadly apply to different types of proteins sheets including viral capids and the protein layers that surround a wide variety of cell types.

Bacterial MCPs have several potential applications in biotechnology. The biological function of MCPs is to enhance metabolic processes by accelerating catalysis and confining toxic metabolic intermediates. Hence, they provide a natural starting point for engineering nanobioreactors for the increased production of renewable chemicals and pharmaceuticals.

Bacterial MCPs have a number of associations to human health: With regard to human health, MCPs are linked to enteric pathogenesis and have potential use as drug delivery vehicles. In addition, certain types of MCPs that are prevalent in the human gut microbiome mediate metabolic processes associated with heart disease.